ENSURED-5G Description of Experimentation
For ENSURED-5G Project (NSC_20_RPP_03)

Submitted by InterDigital Communications, Inc.

1 Introduction

Shared Spectrum Company, InterDigital and Radisys have been awarded the project titled ENSURED-5G by the Army Contracting Command - NJ, Emerging Technologies Center to develop solutions for coexistence of 5G communication systems and certain airborne RADAR systems, such as AWACS. InterDigital is seeking to use the facility at AFRL Stockbridge test and experimentation site for conducting experimentation and recording a video for demonstration.

InterDigital has developed solutions that enable coexistence of 5G and airborne RADAR systems such as AWACS. The purpose of the visit request is to test the operation of the solutions in real-world environments and characterize the performance. This document describes the notional architecture, test plan and procedure, data that will be collected, list of equipment, and the names of the InterDigital employees visiting the base to perform the test.

2 Classification Requirements

This project is UNCLASSIFIED. There are no classification requirements.

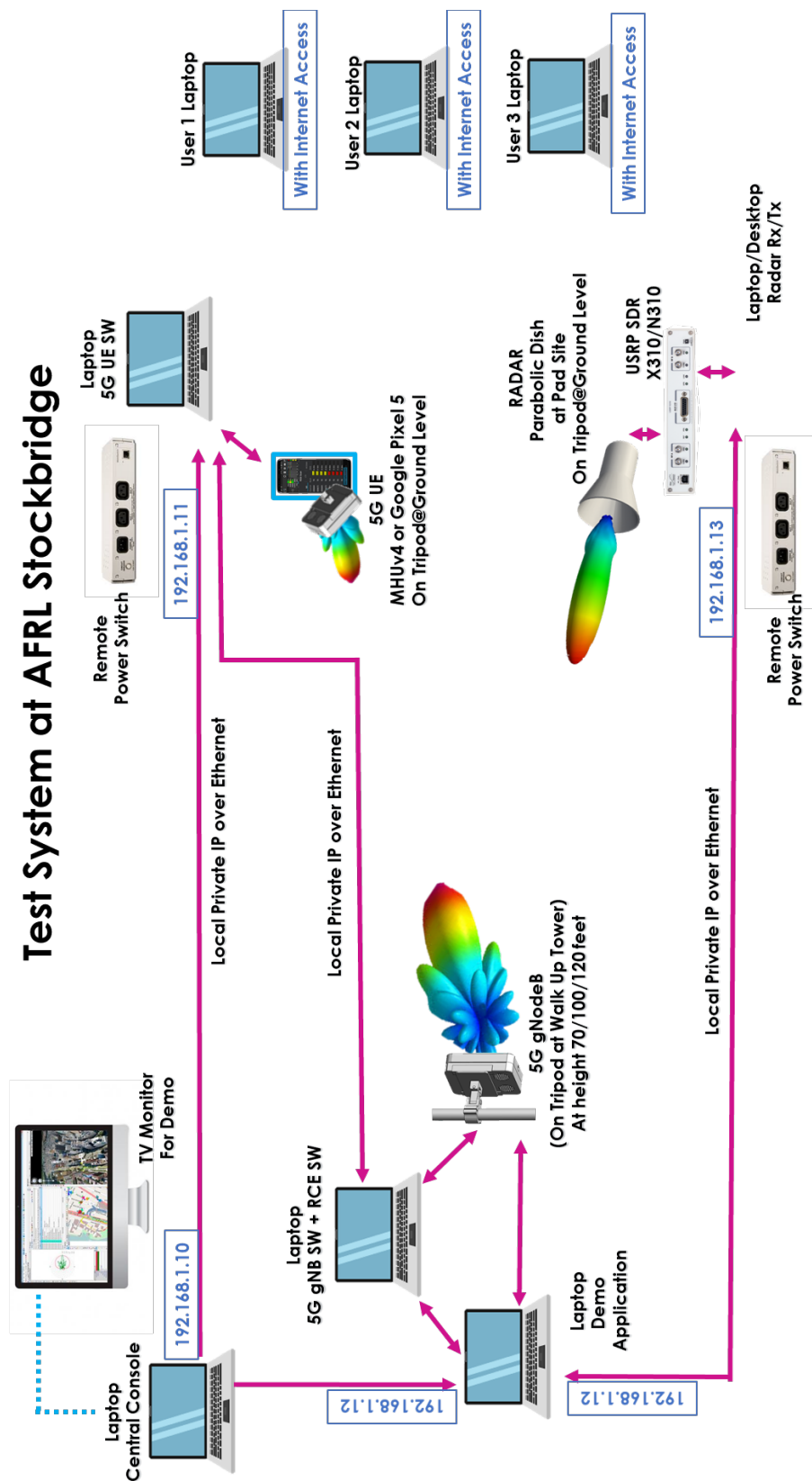# 3 Notional Architecture

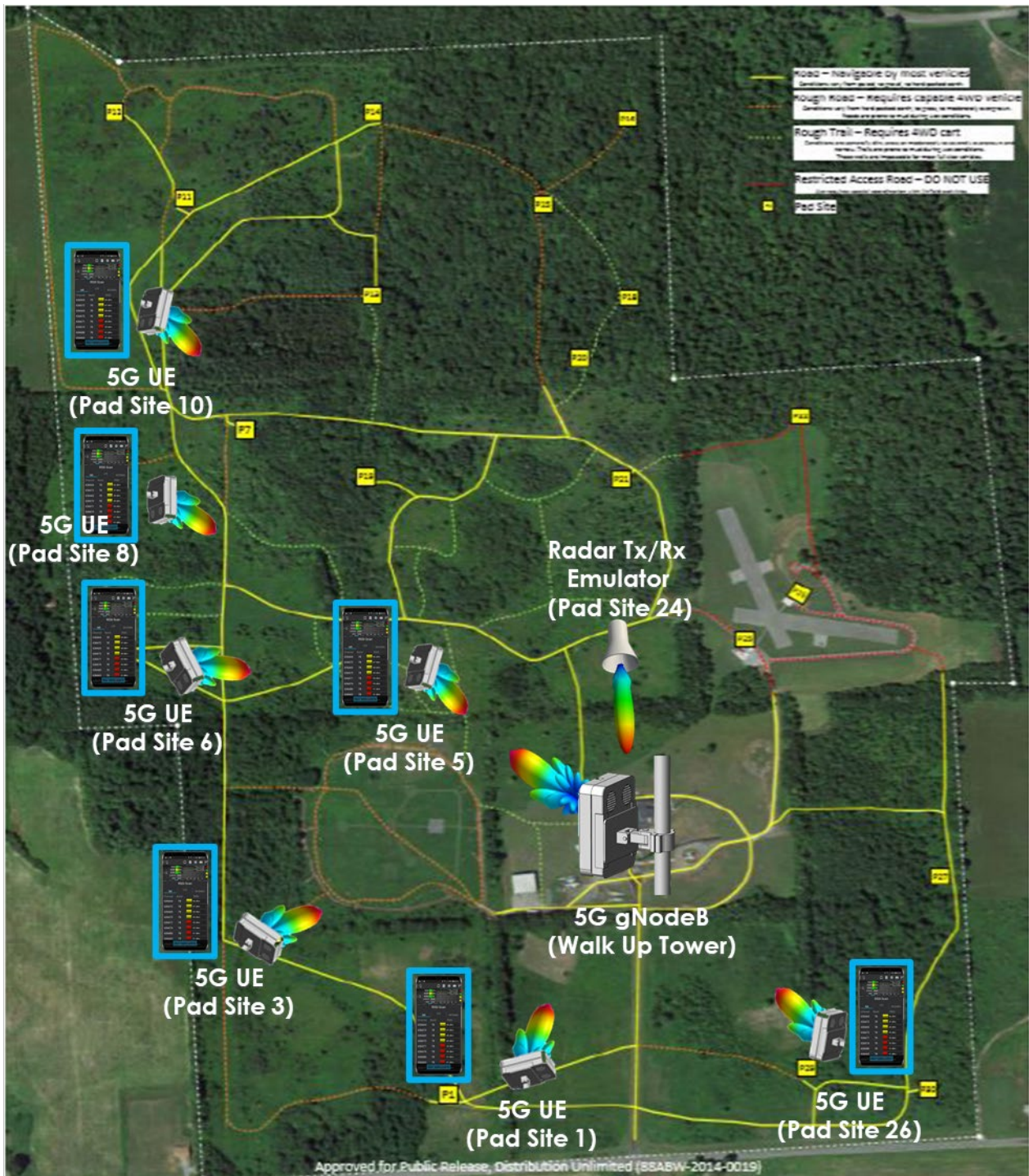# Test System at AFRL Stockbridge

Figure 1 Notional Architecture

**Figure 2 Planned Test Setup at AFRL**

Figure 3 Planned test setup at Tysons, VA

3.1 System Components

3.1.1 5G gNodeB

A node that implements the 5G base station transmissions and receptions. The node (known as MHUv4) is made up of a 4x4 Phased Array Antenna transmitter operating with max EIRP of 39 dBm and RFSoC based 5G baseband implementation. MHUv4 includes beam steering capabilities. The transmit power of MHUv4 can be controlled by software and the transmit power will be minimized for the test requirements. The MHUv4 will be mounted on a tripod and placed on top of the walk in tower at 100 feet to 120 feet height.
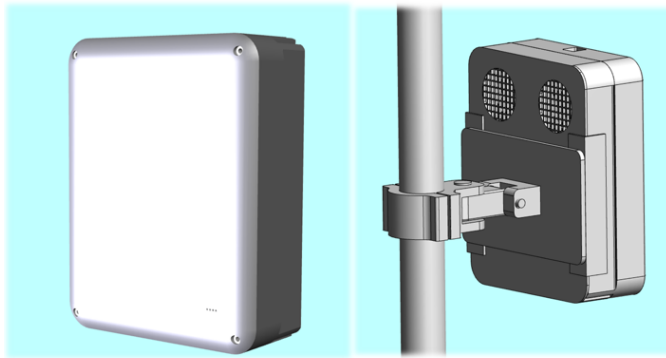
- **Multi-band operation**
  - 3.3 to 3.45 GHz
  - Configurable in the field
  - Switch time between bands is less than one timeslot
- **Vertical polarization operation**
- **PAA**
  - 4(H) by 4(V), total of 16 elements
- **Small aluminum enclosure**
  - 270X210X80mm
- **Output power**
  - EIRP 39 dBm

Figure 4 IDC Radio Unit notional figure

• Frequency band (n48, n77, n78)	3.3 to 3.45 GHz
• Max RF bandwidth for channel aggregation	100MHz
• Gain variation over any 100MHz	+/-1dB
• Number of transceivers	4
• Antenna configuration	4X4 with hybrid BF
• Beam Forming elements	4 digital and 16 analog channels
• Beam steering	+/-45deg (V and H)
• RF output power (EIRP PEP total)	+39dBm (typ)
• Noise figure of any Rx input	5dB max
• Sync	GPS (internal)
• Interfaces	1GE (2), QSFP(2), USB
• DC PoE class 8	up to 95W
• Size (WxHxD)	210x270x90mm
• Weight max	5kg
• Other RF parameters	per TR38.104
• Temperature range	-20C to +55C
• Weatherproof	per IP67

Figure 5 IDC Radio Unit specifications

Figure 6 Tripod used to mount IDC Radio Unit. Pan-tilt motor is currently mounted on the top of the tripod. This will be setup on top of the walk up tower

3.1.2 5G UE

A node that implements the 5G UE transmissions and receptions. This is made from same MHUv4 as 5G gNodeB. 5G UE is also capable of beam steering. In addition, we will also use a commercial 5G UE (Google Pixel 5 and/or Nokia 8.1) for various 5G tests. The 5G UE (MHUv4)will be mounted on a tripod and located at the height of 5-6 feet.

3.1.3 RADAR emulator

This consists of a USRP SDR that repeatedly plays back a RADAR waveform (Chirp). On it's own, the USRP SDR is capable of max 20 dBm transmit power. Depending on the terrain and

foilage, the USRP SDR may be connected to a RF power amplifier with combined max transmit power of 34 dBm. A parabolic dish antenna with 22.5 dBi gain and azimuth and elevation beam width of 12.5 degrees is used to emulate the airborne radar. The RADAR antenna will be mounted on a tripod and located at the height of 5-6 feet. It will not be airborne. The Antenna for RADAR is [KPPA-22.5-3GDPFH-2PK | 3 GHz 22.5 dBi Dual Pol Feed Horn Antenna with Dish (2 Pack Box) (kpperformance.com)](#).
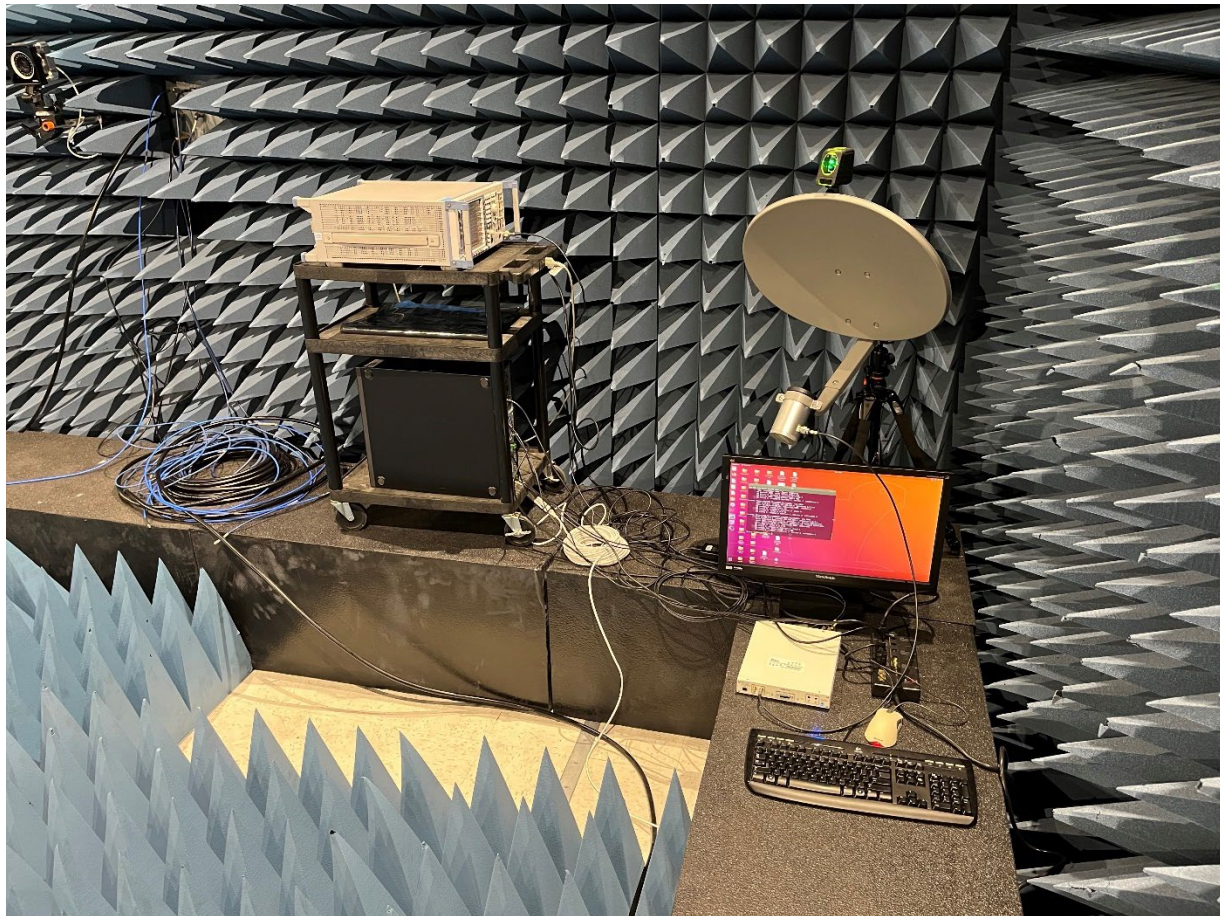

Figure 7 Radar Subsystem.

4 Names of People

Following is the list of US persons who will need access. They are all employees of InterDigital.

- Sudhir B Pattar, 17 Ann Drive, Mount Laurel, NJ 08054
- Philip Pietraski, 39 Marian Lane, Jericho, NY 11753
- Phillip Leithead, 133 Forge Rd, King of Prussia, PA 19406
- Jane Mack: 6A Altamore St, Melville NY. 11747

5 FCC License

InterDigital has applied for FCC license for the band 3.3 – 3.55 GHz with the rated EIRP of 39 dBm for permission to operate the equipment at ARFL Stockbridge experimentation site and at Shared Spectrum Parking Lot, Tysons Corner, VA.. The application is pending approval with FCC,

6 About InterDigital

For four decades, InterDigital has been a pioneer in the wireless space, designing and developing a wide range of advanced technologies that are used in digital cellular and wireless products and networks, including 2G, 3G, 4G, 5G and IEEE 802-related products and networks. Today, InterDigital is a leader in 5G research and beyond, a thought leader in our industry and, over the course of the last two decades, the source of more than 5,000 contributions to key global standards. InterDigital has successfully completed multiple projects for the DoD in past. InterDigital has ongoing projects with DoD. InterDigital has developed a commercial grade end to end 5G solution that addresses both sub-6 GHz bands and mmWave bands.

7 Contact Information

Please reach out to PoC at InterDigital for any queries:

First Name: Sudhir
Last Name: Pattar
Email: Sudhir.Pattar@InterDigital.com
Phone Number: +1 610-878-5616

#	Item	Value
1	Performer/Applicant Name:	InterDigital Communications, Inc.
2	Performer/Applicant Address:	200 Bellevue Parkway, Suite 300 Wilmington, DE 19809 Tel: +1.302.281.3600 Fax: +1.302.281.3763
3	United States Performer/Applicant	Yes
7	Principal Investigator Name	First Name: Sudhir Last Name: Pattar Email: Sudhir.Pattar@InterDigital.com Phone Number: +1 610-878-5616
9	Will this effort contain Human, Animal, and/or Recombinant or Synthetic Nucleic Acid Molecules research?	No
10	If yes, which type?	

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